Contribution ID: **248** Type: **Poster Presentation**

# The search for Dark Matter in association with the Higgs boson with the di-photon decay

*Wednesday, 1 July 2015 16:10 (1h 50m)*

## Abstract content <br>   (Max 300 words)<br><a href="http://events.saip.org.za/getFile.py/a target="_blank">Formatting &<br>Special chars</a>

The ATLAS and CMS experiments at the Large Hadron Collider discovered a Higgs like particle in 2012. The differential and fiducial cross sections of the Higgs are measured using 20.3\,fb$^{-1}$ 2012 data taken at $\sqrt{s}$\,=\,8\,TeV after the discovery by ATLAS. The measurement is focusing on the Higgs kinematics and jet activity, including Higgs transverse momentum, rapidity and Higgs+jet production mode. The Higgs candidates are extracted by fitting the two-photon invariant mass spectrum. The observed kinematic distribution of Higgs is translated to particle level to reduce the detector efficiency and resolution, using bin-by-bin unfolding method. A distortion of Higgs transverse momentum is found in comparison with the state-of-the-art predictions. One of the explanations is the Higgs production associated with invisible particles, such as the dark matter. The observation indicates that the missing particle has intermediate energy and same order of production cross-section as the Standard Model gluon-gluon fusion to Higgs process. The search for dark matter in association with the Higgs boson will be performed in the 2015 data taking in Higgs decaying two-photon channel. The study will focus on the Higgs production associated with intermediate missing energy. The knowledge and understanding of the missing energy reconstruction is critical.

## Apply to be<br> considered for a student <br>   award (Yes / No)?

No

## Level for award<br> (Hons, MSc, <br>   PhD, N/A)?

N/A

## Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?

Yes

## Please indicate whether<br>this abstract may be<br>published online<br>(Yes / No)

Yes

**Primary author:** Dr RUAN, XIFENG (WITS)

**Co-authors:** Prof. MELLADO, Bruce (University of the Witwatersrand); Dr KUREBA, Chamunorwa Oscar (University of the Witwatersrand)

**Presenter:** Dr KUREBA, Chamunorwa Oscar (University of the Witwatersrand)

**Session Classification:** Poster2

**Track Classification:** Track B - Nuclear, Particle and Radiation Physics